

# **TENTATIVE TRACT NO. 17423 PROJECT TRAFFIC IMPACT ANALYSIS**

**City of Costa Mesa**

Prepared for

**CITY OF COSTA MESA**

Prepared by



14725 ALTON PARKWAY, IRVINE, CALIFORNIA 92618-2027  
CONTACT: BOB MATSON 949.472.3505 bobmatson@rbf.com

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JN 10-108158

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## **EXECUTIVE SUMMARY**

This study analyzes forecast traffic conditions associated with the proposed Tentative Tract No. 17423 residential project located on the northeast corner of Harbor Boulevard and Merrimac Way in the City of Costa Mesa. The proposed project consists of a gated 33 single-family dwelling unit residential project. The gated access location at Merrimac Way is planned to accommodate both visitors and residents accessing the project site. The project site is occupied by a closed auto dealership and is not currently generating trips.

The proposed project is forecast to generate approximately 316 daily trips, which include approximately 24 a.m. peak hour trips and approximately 33 p.m. peak hour trips.

The Harbor Boulevard/Merrimac Way study intersection is currently operating at an acceptable LOS (LOS D or better) and is forecast to continue to operate at an acceptable LOS with the addition of project-generated trips according to City of Costa Mesa performance criteria for forecast existing plus project conditions.

No significant traffic impacts for forecast to occur as a result of the proposed project based on City of Costa Mesa established thresholds of significance for existing plus project conditions. Hence, no traffic mitigation measures are required for the proposed project.

Based on the ingress Crommelin queue analysis, the proposed project site plan is forecast to provide adequate queue storage to accommodate the forecast 25 foot queue.

## INTRODUCTION

This study analyzes forecast traffic conditions associated with the proposed Tentative Tract No. 17423 residential project located on the northeast corner of Harbor Boulevard and Merrimac Way in the City of Costa Mesa. The proposed project consists of a gated 33 single-family dwelling unit residential project. The gated access location at Merrimac Way is planned to accommodate both visitors and residents accessing the project site. The project site is occupied by a closed auto dealership and is not currently generating trips.

Exhibit 1 shows the regional location of the project site. Exhibit 2 shows the project site location.

This study analyzes the Harbor Boulevard/Merrimac Way study intersection during weekday a.m. and p.m. peak hour conditions for the following study analysis scenarios:

- Existing Conditions; and
- Forecast Existing Plus Project Conditions.

## Analysis Methodology

Level of service (LOS) is commonly used as a qualitative description of intersection operation and is based on the capacity of the intersection and the volume of traffic using the intersection. The *Intersection Capacity Utilization (ICU)* analysis method is utilized by the City of Costa Mesa to determine the operating LOS of signalized intersections. The *ICU* analysis methodology describes the operation of an intersection using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding volume to capacity (V/C) ratios shown in Table 1.

**Table 1**  
**V/C & LOS Ranges**

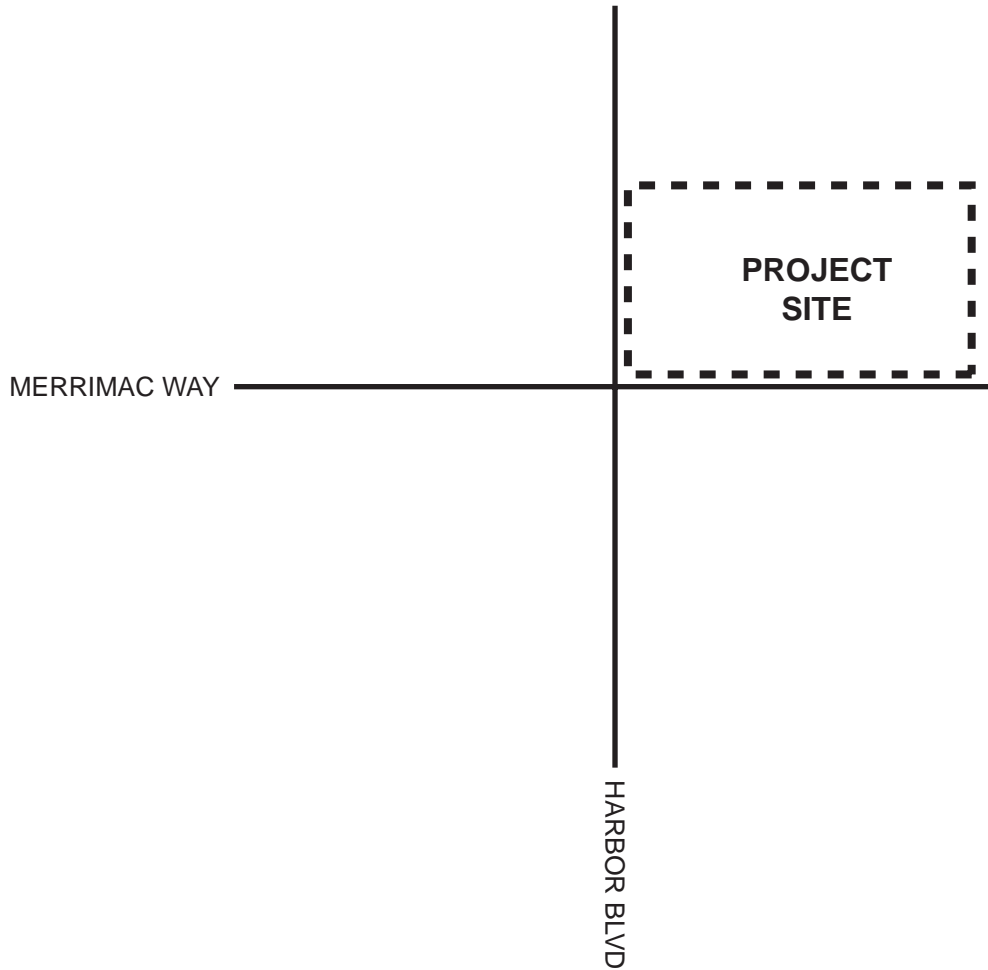
Signalized Intersections	
LOS	V/C Ratio
A	$\leq 0.600$
B	0.610 to $\leq 0.700$
C	0.710 to $\leq 0.800$
D	0.810 to $\leq 0.900$
E	0.910 to $\leq 1.000$
F	$> 1.000$

Source: 1990 Transportation Research Board.

## Performance Criteria

The City of Costa Mesa goal for peak hour intersection operation is LOS D or better.





Legend:

--- Project Site Boundary



Not to Scale



## Project Site Location

## Thresholds of Significance

To determine whether the addition of project-generated trips results in a significant impact at a study intersection, and thus requires mitigation, the City of Costa Mesa utilizes the following threshold of significance:

- A significant project impact occurs at a signalized study intersection when the addition of project-generated trips causes the peak hour level of service of the study intersection to change from acceptable operation (LOS A, B, C, or D) to deficient operation (LOS E or F).

## EXISTING CONDITIONS

This section analyzes existing peak hour traffic conditions at the Harbor Boulevard/Merrimac Way study intersection.

### Existing Conditions Peak Hour Traffic Volumes

To determine the existing operation of the Harbor Boulevard/Merrimac Way study intersection, a.m. and p.m. peak period intersection movement counts were collected in July 2011 on a weekday. The a.m. peak period intersection counts were collected from 7:00 a.m. to 9:00 a.m. and the p.m. peak period intersection counts were collected from 4:00 p.m. to 6:00 p.m. The counts used in this analysis were taken from the highest hour within the peak period counted; detailed peak hour count sheets are contained in Appendix A.

Exhibit 3 shows existing conditions a.m. and p.m. peak hour volumes at the Harbor Boulevard/Merrimac Way study intersection. Exhibit 4 shows existing study intersection geometry.

### Existing Conditions Peak Hour Intersection LOS

Table 2 summarizes existing conditions a.m. and p.m. peak hour LOS of the Harbor Boulevard/Merrimac Way study intersection; detailed LOS analysis sheets are contained in Appendix B.

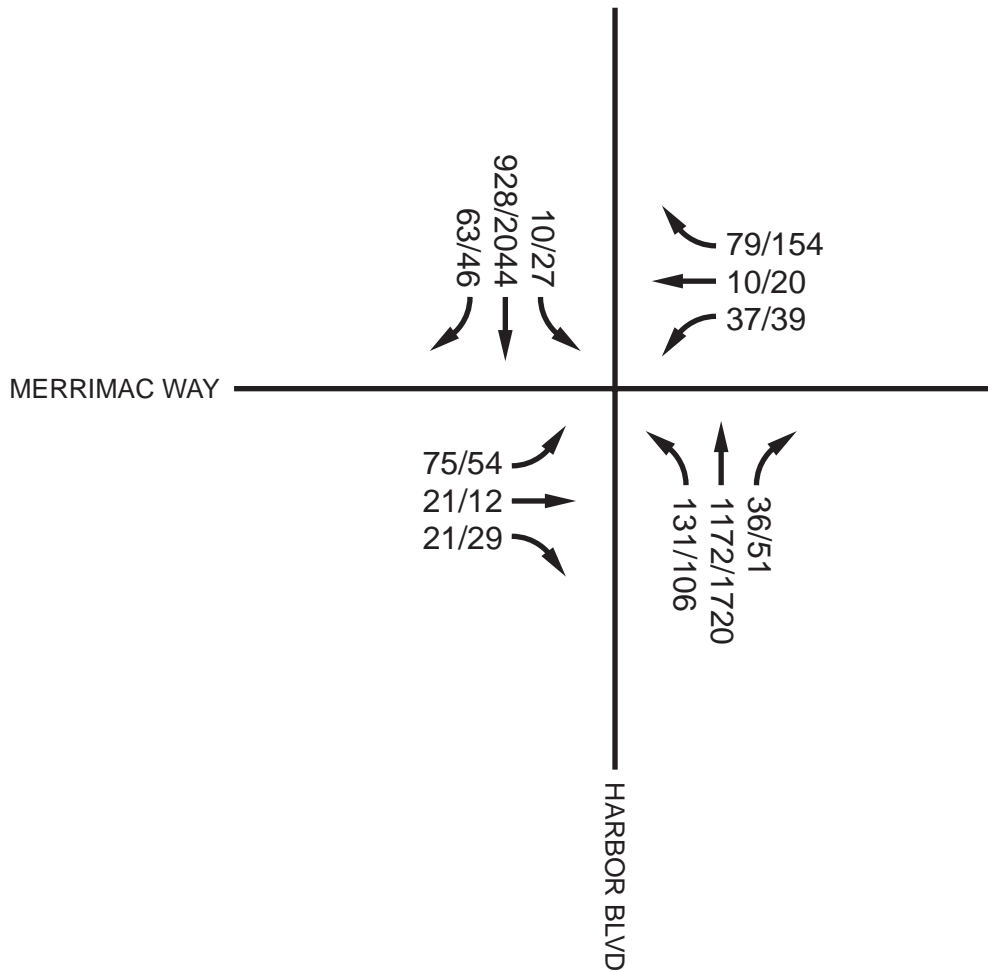
**Table 2**  
**Existing Conditions AM & PM Peak Hour Intersection LOS**

Study Intersection	AM Peak Hour	PM Peak Hour
	V/C – LOS	V/C – LOS
Harbor Boulevard/Merrimac Way	0.36 – A	0.59 – A

**Note:** V/C = volume to capacity ratio.

As shown in Table 2, the Harbor Boulevard/Merrimac Way study intersection is currently operating at an acceptable level of service (LOS D or better) according to City of Costa Mesa performance criteria during the a.m. peak hour and the p.m. peak hour.





Legend:

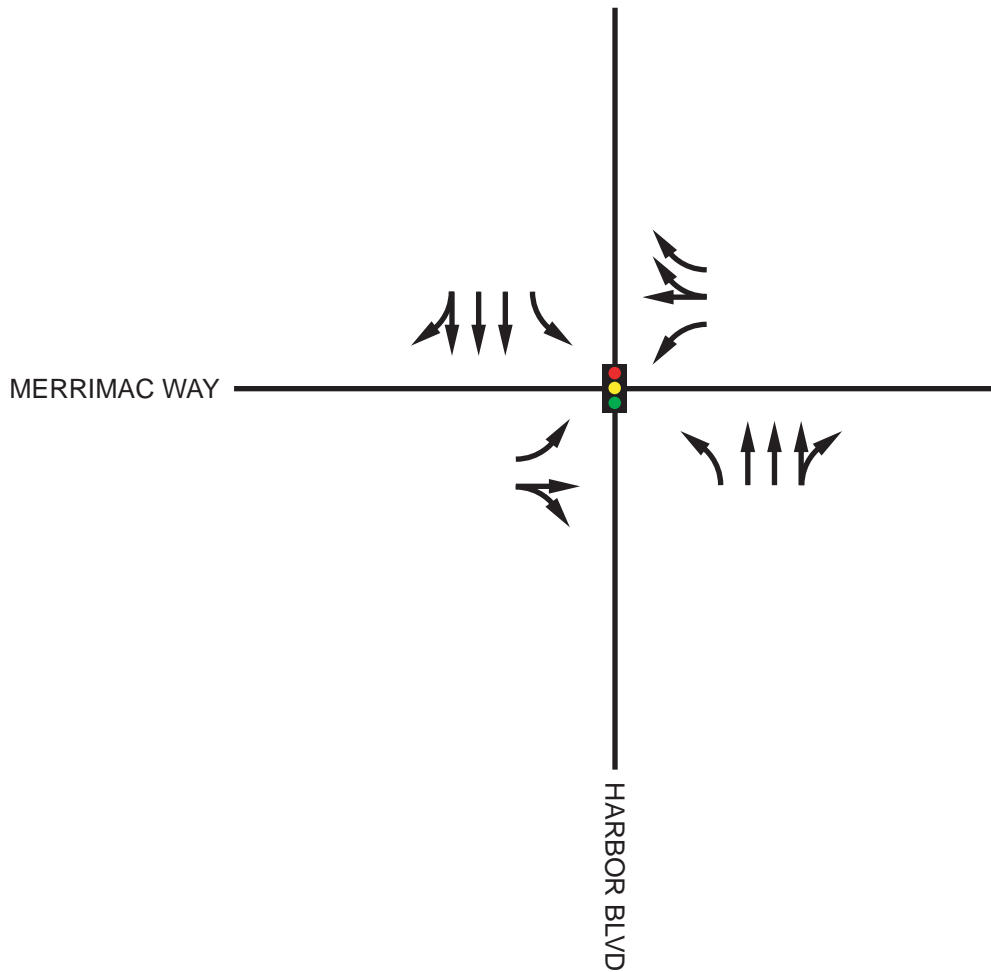
XX/XX AM/PM Peak Hour Volumes



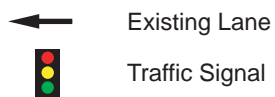
Not to Scale



## Existing AM/PM Peak Hour Intersection Volumes



Legend:



Not to Scale



## Existing Study Intersection Geometry/Control

## PROPOSED PROJECT

The proposed project consists of a gated 33 single-family dwelling unit residential project. The gated access location at Merrimac Way is planned to accommodate both visitors and residents accessing the project site. The project site is occupied by a closed auto dealership and is not currently generating trips. Exhibit 5 shows the site plan of the proposed project.

### Project Trip Generation

To calculate trips forecast to be generated by the proposed project, *ITE* trip generation rates were utilized. Table 3 summarizes the *ITE* trip generation rates used to calculate the number of trips forecast to be generated by the proposed project.

**Table 3**  
***ITE* Trip Rates**

Land Use (ITE Code)	Units	AM Peak Hour Rates			PM Peak Hour Rates			Daily Trip Rate
		In	Out	Total	In	Out	Total	
Single-Family Detached Housing (210)	du	0.19	0.56	0.75	0.64	0.37	1.01	9.57

**Sources:** 2008 *ITE Trip Generation Manual*, 8<sup>th</sup> Edition.

**Note:** du = dwelling units.

Table 4 summarizes the trips forecast to be generated by the proposed project utilizing the trip generation rates shown in Table 3.

**Table 4**  
**Forecast Trip Generation of Proposed Project**

Land Use	AM Peak Hour Trips			PM Peak Hour Trips			Daily Trips
	In	Out	Total	In	Out	Total	
33 du – Single-Family Detached Housing	6	18	24	21	12	33	316

**Note:** du = dwelling units.

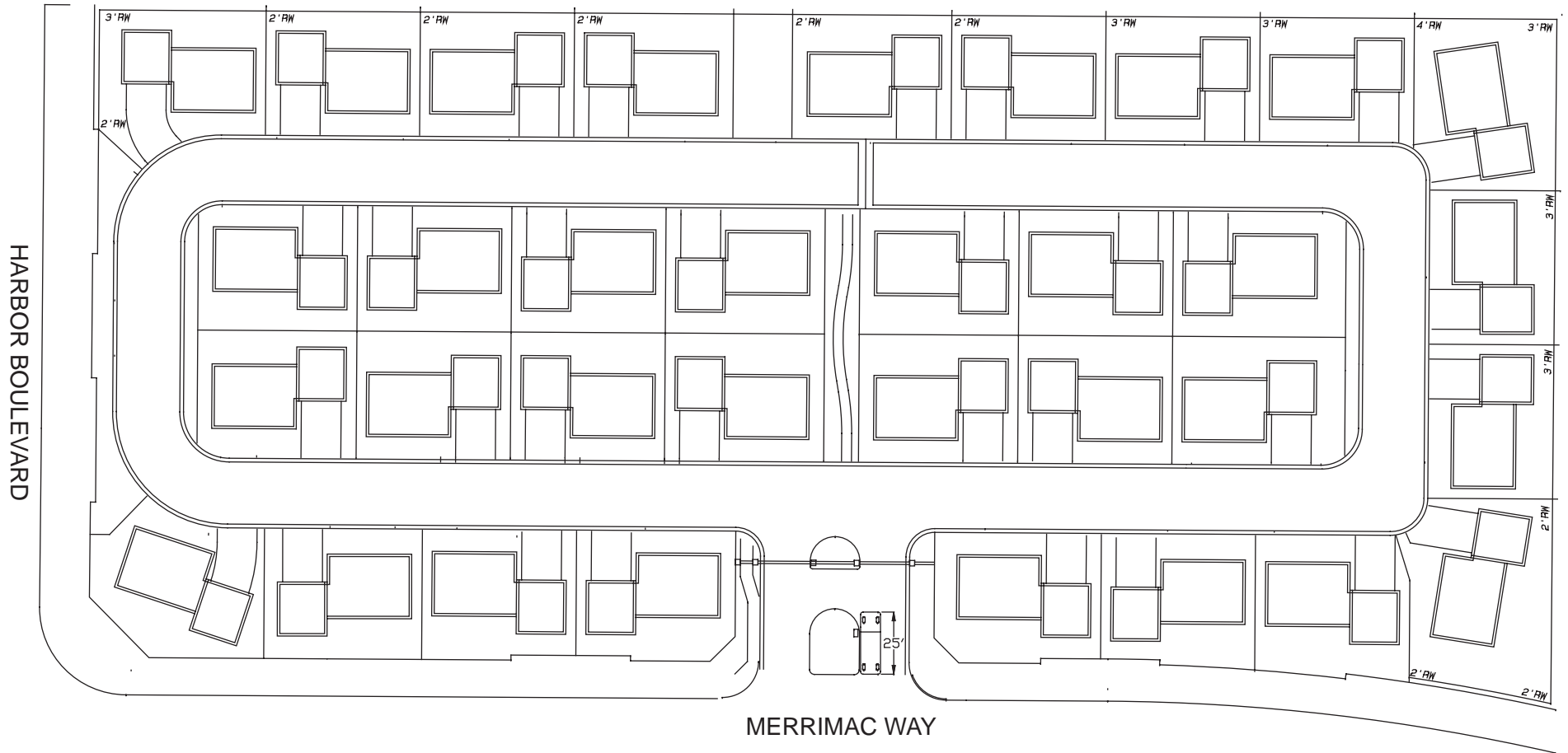
As shown in Table 4, the proposed project is forecast to generate approximately 316 daily trips, which include approximately 24 a.m. peak hour trips and approximately 33 p.m. peak hour trips.

### Project Trip Distribution

Exhibit 6 shows forecast trip percent distribution of project-generated trips.

### Project Trip Assignment

Exhibit 7 shows the corresponding assignment of project-generated peak hour trips assuming the trip percent distribution shown in Exhibit 6.



Source: Knitter Partners International, inc.



Not to Scale

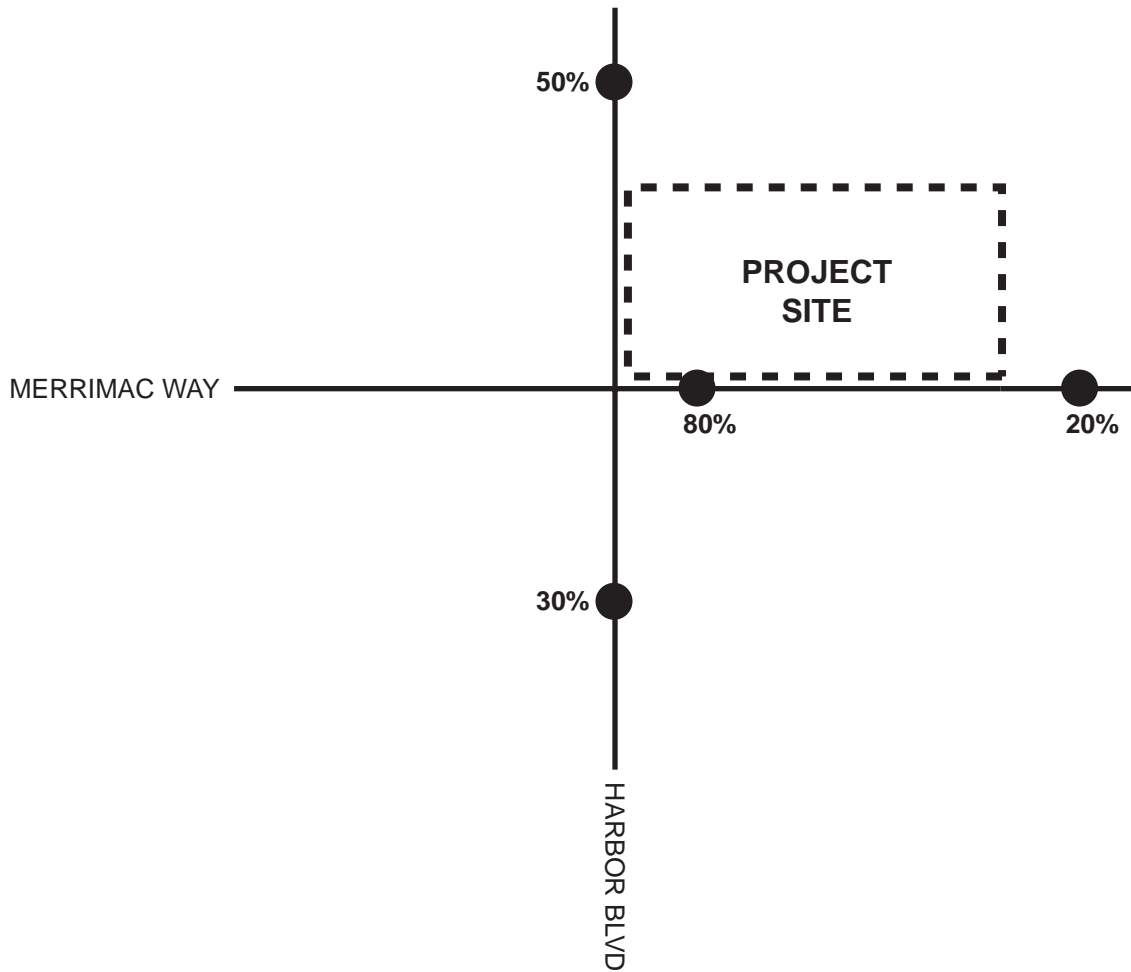


H:\pdata\10108158\Traffic\Exhibits\Exh05.ai

JUL/2011

**Proposed Project Site Plan**

Exhibit 5



Legend:

● XX% Percent Trip Distribution

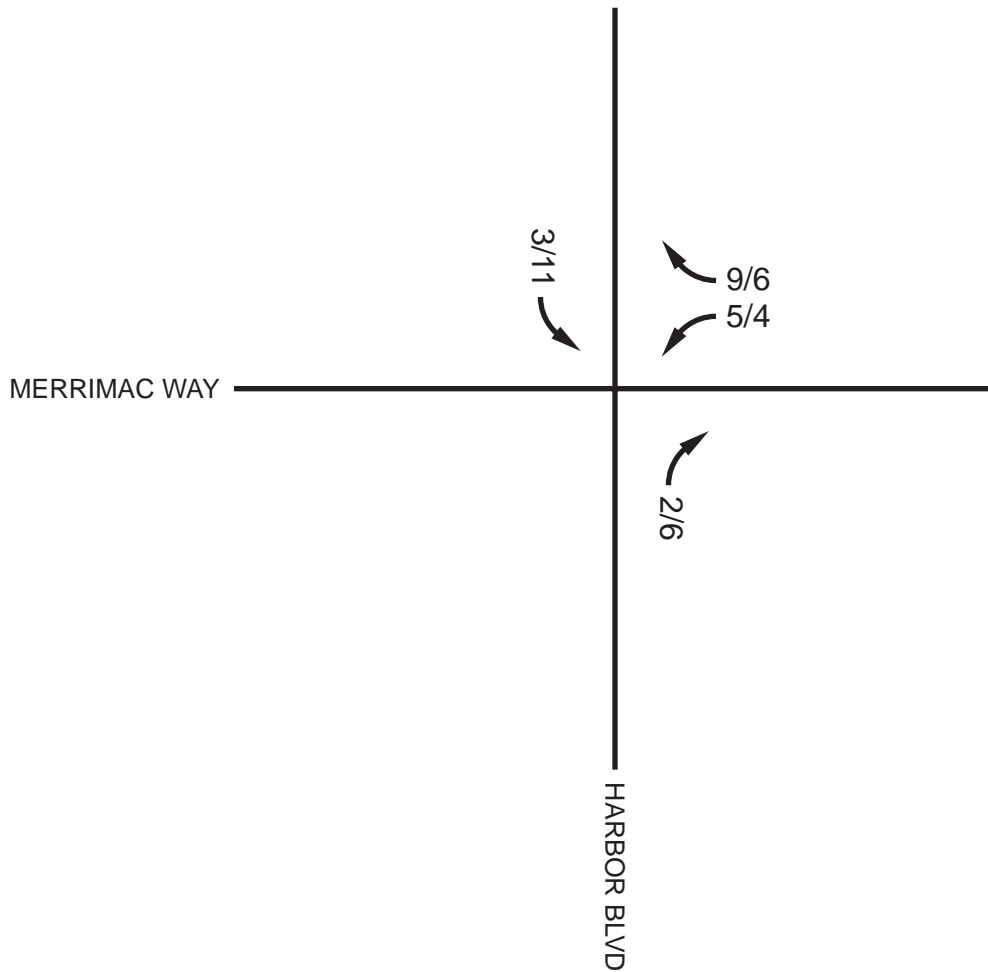
- - - Project Site Boundary



Not to Scale



## Forecast Proposed Project Trip Distribution



Legend:

XX/XX AM/PM Peak Hour Volumes



Not to Scale



## Forecast AM/PM Peak Hour Trip Assignment of Proposed Project

## FORECAST EXISTING PLUS PROJECT CONDITIONS

This section summarizes traffic conditions associated with forecast existing plus project conditions.

### Forecast Existing Plus Project Conditions Traffic Volumes

Forecast existing plus project conditions a.m. and p.m. peak hour volumes were derived by adding forecast project-generated trips to existing conditions traffic volumes.

Exhibit 8 shows forecast existing plus project conditions a.m. and p.m. peak hour volumes at the Harbor Boulevard/Merrimac Way study intersection.

### Forecast Existing Plus Project Conditions Intersection LOS

Table 5 summarizes forecast existing plus project conditions a.m. and p.m. peak hour LOS of the Harbor Boulevard/Merrimac Way study intersection; detailed LOS analysis sheets are contained in Appendix B.

**Table 5**  
**Forecast Existing Plus Project Conditions AM & PM Peak Hour Intersection LOS**

Study Intersection	Existing Conditions		Forecast Existing Plus Project Conditions		Significant Impact?
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
	V/C – LOS	V/C – LOS	V/C – LOS	V/C – LOS	
Harbor Boulevard/Merrimac Way	0.36 – A	0.59 – A	0.37 – A	0.59 – A	No

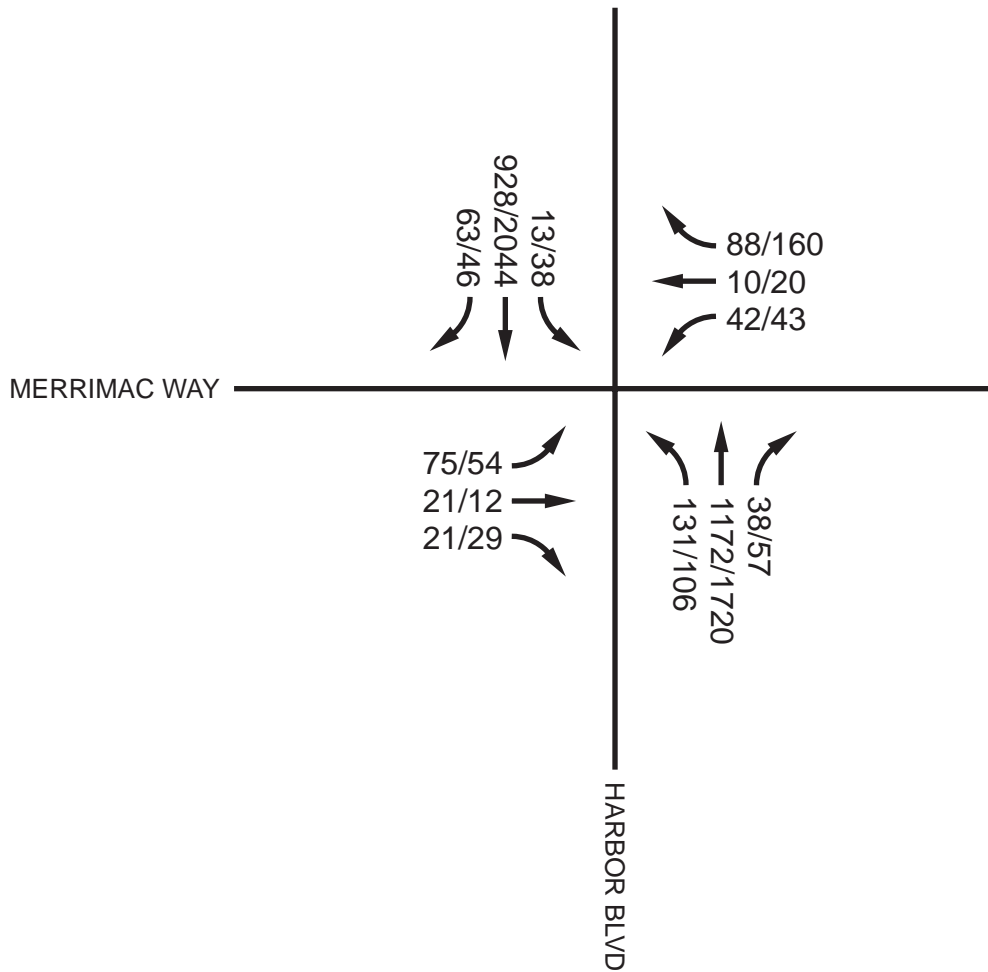
**Note:** V/C = volume to capacity ratio.

As shown in Table 5, with the addition of project-generated trips, the Harbor Boulevard/Merrimac Way study intersection is forecast to continue to operate at an acceptable LOS (LOS D or better) according to City of Costa Mesa performance criteria for forecast existing plus project conditions.

As also shown in Table 5, no significant traffic impacts for forecast to occur as a result of the proposed project based on City of Costa Mesa established thresholds of significance for existing plus project conditions. Hence, no traffic mitigation measures are required for the proposed project.

## INGRESS QUEUE ANALYSIS

To determine the required queue storage capacity for the gated access location of the proposed project, an ingress queue analysis has been prepared. At a gated ingress location, the critical vehicular queue length requirement is based on the queue generated by visitors who have to wait at a call box to be let into the community. Residents have immediate access and therefore do not queue outside the gates.



Legend:

XX/XX AM/Mid-Day/PM Peak Hour Volumes



Not to Scale



## Forecast Existing Plus Project AM/PM Peak Hour Intersection Volumes



## Analysis Methodology

The Crommelin Methodology is a queuing analysis methodology used to determine the required storage reservoir required for visitors and visitors at entryways to gated communities, based on *Entrance-Exit Design and Control for Major Parking Facilities* (Robert W. Crommelin, October 5, 1972). The Crommelin Methodology determines the minimum storage length required to provide adequate access and control at gated entry points to ensure the design of an efficient access system with minimal impacts on the surrounding street network. The methodology is based on worst case peak hour volumes, gate control strategies, the processing rate at the control point and the number of travel lanes. The determination of the reservoir length required to serve peak hour volumes is based on a Poisson distribution.

A traffic intensity factor is calculated by dividing peak hour traffic volumes by the control point processing rate. The intensity factor is plotted on a Crommelin Reservoir Needs nomograph to determine the number of vehicles queuing behind the control point service position based on a selected confidence interval. The forecast queue of vehicles is increased by one vehicle to account for the service position vehicle and multiplied by 25 feet per vehicle to determine the total required storage capacity.

### Project Ingress Crommelin Queue Analysis

The following conservative assumptions were made in determining data input for the queuing analysis:

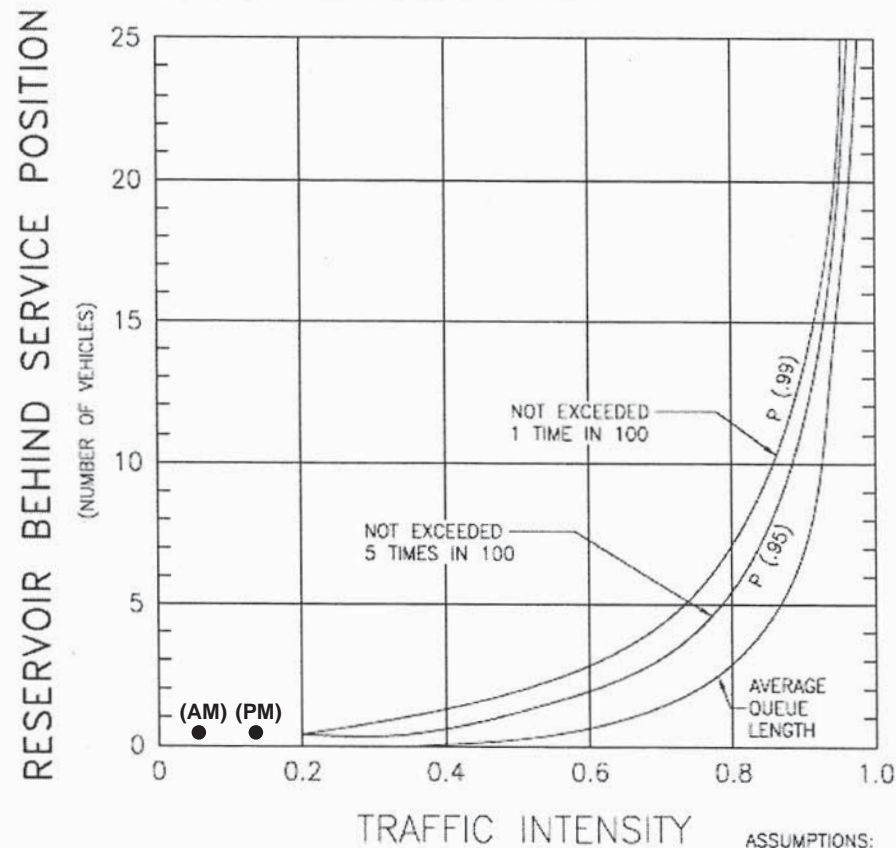
- 25% of all inbound project trip generation during both the a.m. and p.m. peak hours is assumed to be visitor trips.
- The processing rate at the control point is assumed to be 60 vehicles per hour (i.e., one visitor vehicle every 60 seconds can be processed and continue through the gate).
- The analysis is based on a 99% confidence interval (i.e., 99% of the time, the queue will be equal to or less than the maximum vehicle queue).

Table 6 summarizes the results of the Crommelin queuing analysis for the project ingress location on Merrimac Way; Exhibit 9 contains the Crommelin Reservoir Needs nomograph for the project driveway.

**Table 6**  
**Project Driveway Ingress Crommelin Queuing Analysis Summary**

Location	Time Period	Entering Vehicle Volume	Service Rate (veh/hr)	Traffic Intensity Factor	Maximum Vehicle Queue	Required Queue Storage Capacity (feet)	Queue Storage Capacity Provided (feet)	Adequate Queue Storage Provided?
Project Driveway	AM	2	60	0.0333	1	25	25	Yes
	PM	5	60	0.0833	1	25	25	Yes

## RESERVOIR NEEDS VS TRAFFIC INTENSITY



1



Not to Scale



## Crommelin Project Gate Queuing Analysis - AM & PM Peak Hour

As shown in Table 6, the project ingress location is forecast to have a maximum queue of one visitor vehicle during the a.m. peak hour and one visitor vehicle during the p.m. peak hour, hence requiring a minimum storage length of 25 feet between the visitor call box and Merrimac Way to accommodate the visitor vehicular queue during both the a.m. peak hour and p.m. peak hour.

As also shown in Table 6, the proposed project site plan is forecast to provide adequate queue storage (shown in Exhibit 5) to accommodate the forecast 25 foot queue.

## **CONCLUSIONS**

The proposed project is forecast to generate approximately 316 daily trips, which include approximately 24 a.m. peak hour trips and approximately 33 p.m. peak hour trips.

The Harbor Boulevard/Merrimac Way study intersection is currently operating at an acceptable LOS (LOS D or better) and is forecast to continue to operate at an acceptable LOS with the addition of project-generated trips according to City of Costa Mesa performance criteria for forecast existing plus project conditions.

No significant traffic impacts for forecast to occur as a result of the proposed project based on City of Costa Mesa established thresholds of significance for existing plus project conditions. Hence, no traffic mitigation measures are required for the proposed project.

Based on the ingress Crommelin queue analysis, the proposed project site plan is forecast to provide adequate queue storage to accommodate the forecast 25 foot queue.

## **APPENDIX A**

### **Existing Count Data**

# INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:  
7/6/11  
WEDNESDAY

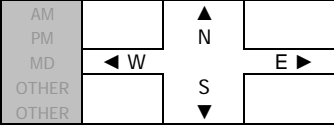
LOCATION:  
NORTH & SOUTH:  
EAST & WEST:

COSTA MESA  
HARBOR  
MERRIMAC

PROJECT #:  
LOCATION #:  
CONTROL:

CA11-0708-01  
1  
SIGNAL

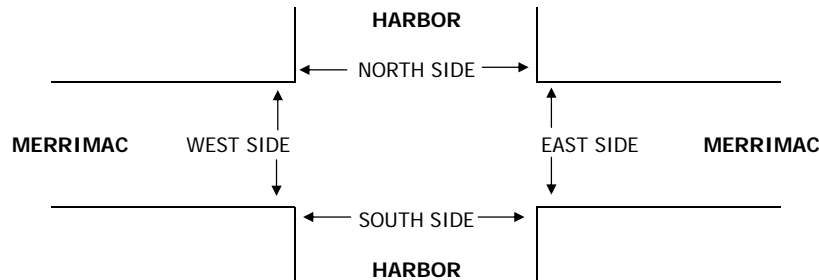
NOTES:



	NORTHBOUND HARBOR			SOUTHBOUND HARBOR			EASTBOUND MERRIMAC			WESTBOUND MERRIMAC			
LANES:	NL 1	NT 3	NR 0	SL 2	ST 3	SR 0	EL 1	ET 1	ER 0	WL 1	WT 0.5	WR 1.5	TOTAL

U-TURNS				
NB X	SB X	EB X	WB X	TTL

AM	7:00 AM	10	186	8	1	148	3	9	2	7	2	1	5	382
	7:15 AM	21	210	9	6	172	7	9	6	7	3	4	8	462
	7:30 AM	19	257	13	8	183	11	23	3	8	5	6	15	551
	7:45 AM	33	261	15	3	219	17	18	5	3	5	3	10	592
	8:00 AM	39	267	8	2	213	20	30	5	4	13	3	21	625
	8:15 AM	27	286	6	3	218	23	13	7	6	8	4	22	623
	8:30 AM	29	286	9	3	220	10	18	2	8	8	0	15	608
	8:45 AM	36	333	13	2	277	10	14	7	3	8	3	21	727
	VOLUMES	214	2,086	81	28	1,650	101	134	37	46	52	24	117	4,570
	APPROACH %	9%	88%	3%	2%	93%	6%	62%	17%	21%	27%	12%	61%	
PM	APP/DEPART	2,381	/	2,337	1,779	/	1,748	217	/	146	193	/	339	0
	BEGIN PEAK HR	8:00 AM												
	VOLUMES	131	1,172	36	10	928	63	75	21	21	37	10	79	2,583
	APPROACH %	10%	88%	3%	1%	93%	6%	64%	18%	18%	29%	8%	63%	
	PEAK HR FACTOR	0.876												
	APP/DEPART	1,339	/	1,326	1,001	/	986	117	/	67	126	/	204	0
	4:00 PM	29	358	10	15	454	11	22	3	7	6	9	29	953
	4:15 PM	28	354	15	9	451	12	12	6	9	9	9	34	948
	4:30 PM	33	367	17	8	459	9	14	1	8	17	3	50	986
	4:45 PM	15	391	18	8	456	21	15	8	4	17	2	55	1,010
PM	5:00 PM	18	419	14	5	471	12	22	3	8	13	6	42	1,033
	5:15 PM	22	425	12	6	578	8	16	5	7	11	7	33	1,130
	5:30 PM	29	451	12	9	512	10	12	2	2	6	4	47	1,096
	5:45 PM	37	425	13	7	483	16	4	2	12	9	3	32	1,043
	VOLUMES	211	3,190	111	67	3,864	99	117	30	57	88	43	322	8,199
	APPROACH %	6%	91%	3%	2%	96%	2%	57%	15%	28%	19%	9%	71%	
	APP/DEPART	3,512	/	3,629	4,030	/	4,009	204	/	208	453	/	353	0
	BEGIN PEAK HR	5:00 PM												
	VOLUMES	106	1,720	51	27	2,044	46	54	12	29	39	20	154	4,302
	APPROACH %	6%	92%	3%	1%	97%	2%	57%	13%	31%	18%	9%	72%	
	PEAK HR FACTOR	0.954												
	APP/DEPART	1,877	/	1,928	2,117	/	2,112	95	/	90	213	/	172	0



AM	7:00 AM					0
	7:15 AM					0
	7:30 AM					0
	7:45 AM					0
	8:00 AM					0
	8:15 AM					0
	8:30 AM					0
	8:45 AM					0
	TOTAL	0	0	0	0	0
PM	4:00 PM					0
	4:15 PM					0
	4:30 PM					0
	4:45 PM					0
	5:00 PM					0
	5:15 PM					0
	5:30 PM					0
	5:45 PM					0
	TOTAL	0	0	0	0	0

PEDESTRIAN CROSSINGS				
N SIDE	S SIDE	E SIDE	W SIDE	TOTAL
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0

PEDESTRIAN ACTIVATIONS				
N SIDE	S SIDE	E SIDE	W SIDE	TOTAL
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0

BICYCLE CROSSINGS				
NS	SS	ES	WS	TOTAL
				0
				0
				0
				0
				0
				0
				0
				0
0	0	0	0	0

## **APPENDIX B**

### **LOS Analysis Sheets**

## **Existing Conditions**

COSTA MESA TTM 17423 JN: 10-108158  
EXISTING CONDITIONS  
AM PEAK HOUR

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.363
Loss Time (sec):   0          Average Delay (sec/veh):      xxxxxx
Optimal Cycle:    29          Level Of Service:            A
*****
Approach:         North Bound      South Bound      East Bound      West Bound
Movement:         L - T - R        L - T - R        L - T - R        L - T - R
-----|-----|-----|-----|
Control:          Protected        Protected        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:       0 0 0            0 0 0            0 0 0            0 0 0
Y+R:              4.0 4.0 4.0        4.0 4.0 4.0        4.0 4.0 4.0        4.0 4.0 4.0
Lanes:            1 0 2 1 0          1 0 2 1 0          1 0 0 1 0          1 0 0 1 1
-----|-----|-----|-----|
Volume Module:
Base Vol:         131 1172 36      10 928 63      75 21 21      37 10 79
Growth Adj:       1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:      131 1172 36      10 928 63      75 21 21      37 10 79
User Adj:         1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:          1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Volume:       131 1172 36      10 928 63      75 21 21      37 10 79
Reduct Vol:       0 0 0            0 0 0            0 0 0            0 0 0
Reduced Vol:      131 1172 36      10 928 63      75 21 21      37 10 79
PCE Adj:          1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
MLF Adj:          1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
FinalVolume:      131 1172 36      10 928 63      75 21 21      37 10 79
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:         1600 1600 1600    1600 1600 1600  1600 1600 1600  1600 1600 1600
Adjustment:       1.00 1.00 1.00    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Lanes:            1.00 2.91 0.09    1.00 2.81 0.19  1.00 0.50 0.50  1.00 0.22 1.78
Final Sat.:       1600 4657 143    1600 4495 305  1600 800 800    1600 360 2840
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:          0.08 0.25 0.25    0.01 0.21 0.21  0.05 0.03 0.03  0.02 0.03 0.03
Crit Moves:       ****              ****              ****              ****
*****

```



COSTA MESA TTM 17423 JN: 10-108158  
EXISTING CONDITIONS  
PM PEAK HOUR

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.590
Loss Time (sec):   0          Average Delay (sec/veh):      xxxxxx
Optimal Cycle:     45          Level Of Service:           A
*****
Approach:         North Bound      South Bound      East Bound      West Bound
Movement:         L - T - R        L - T - R        L - T - R        L - T - R
-----|-----|-----|-----|
Control:          Protected        Protected        Permitted        Permitted
Rights:           Include          Include          Include          Include
Min. Green:       0 0 0            0 0 0            0 0 0            0 0 0
Y+R:              4.0 4.0 4.0        4.0 4.0 4.0        4.0 4.0 4.0        4.0 4.0 4.0
Lanes:            1 0 2 1 0          1 0 2 1 0          1 0 0 1 0          1 0 0 1 1
-----|-----|-----|-----|
Volume Module:
Base Vol:         106 1720 51      27 2044 46      54 12 29      39 20 154
Growth Adj:       1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
Initial Bse:      106 1720 51      27 2044 46      54 12 29      39 20 154
User Adj:         1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
PHF Adj:          1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
PHF Volume:       106 1720 51      27 2044 46      54 12 29      39 20 154
Reduct Vol:       0 0 0            0 0 0            0 0 0            0 0 0
Reduced Vol:      106 1720 51      27 2044 46      54 12 29      39 20 154
PCE Adj:          1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
MLF Adj:          1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
FinalVolume:      106 1720 51      27 2044 46      54 12 29      39 20 154
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:         1600 1600 1600    1600 1600 1600    1600 1600 1600    1600 1600 1600
Adjustment:       1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00    1.00 1.00 1.00
Lanes:            1.00 2.91 0.09    1.00 2.93 0.07    1.00 0.29 0.71    1.00 0.23 1.77
Final Sat.:       1600 4662 138    1600 4694 106    1600 468 1132    1600 368 2832
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:          0.07 0.37 0.37    0.02 0.44 0.44    0.03 0.03 0.03    0.02 0.05 0.05
Crit Moves:       ****              ****              ****              ****
*****

```

## **Forecast Existing Plus Project Conditions**

COSTA MESA TTM 17423 JN: 10-108158  
FORECAST EXISTING PLUS PROJECT CONDITIONS  
AM PEAK HOUR

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.366
Loss Time (sec):    0          Average Delay (sec/veh):      xxxxxx
Optimal Cycle:     29          Level Of Service:      A
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Include      Include      Include
Min. Green:      0 0 0      0 0 0      0 0 0      0 0 0
Y+R:      4.0 4.0 4.0      4.0 4.0 4.0      4.0 4.0 4.0      4.0 4.0 4.0
Lanes:      1 0 2 1 0      1 0 2 1 0      1 0 0 1 0      1 0 0 1 1
-----|-----|-----|-----|
Volume Module:
Base Vol:      131 1172      36      10 928      63      75 21      21      37 10      79
Growth Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
Initial Bse:      131 1172      36      10 928      63      75 21      21      37 10      79
Added Vol:      0 0      2      3 0      0      0 0      0      5 0      9
PasserByVol:      0 0      0      0 0      0      0 0      0      0 0      0
Initial Fut:      131 1172      38      13 928      63      75 21      21      42 10      88
User Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
PHF Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
PHF Volume:      131 1172      38      13 928      63      75 21      21      42 10      88
Reduct Vol:      0 0      0      0 0      0      0 0      0      0 0      0
Reduced Vol:      131 1172      38      13 928      63      75 21      21      42 10      88
PCE Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
MLF Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
FinalVolume:      131 1172      38      13 928      63      75 21      21      42 10      88
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1600 1600      1600      1600 1600      1600      1600 1600      1600      1600 1600      1600
Adjustment:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
Lanes:      1.00 2.91      0.09      1.00 2.81      0.19      1.00 0.50      0.50      1.00 0.20      1.80
Final Sat.:      1600 4649      151      1600 4495      305      1600 800      800      1600 327      2873
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:      0.08 0.25      0.25      0.01 0.21      0.21      0.05 0.03      0.03      0.03 0.03      0.03
Crit Moves:      ****          ****          ****          ****
*****

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COSTA MESA TTM 17423 JN: 10-108158  
 FORECAST EXISTING PLUS PROJECT CONDITIONS  
 PM PEAK HOUR

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

```

*****
Intersection #1
*****
Cycle (sec):      100          Critical Vol./Cap.(X):      0.592
Loss Time (sec):    0          Average Delay (sec/veh):      xxxxxx
Optimal Cycle:     46          Level Of Service:      A
*****
Approach:      North Bound      South Bound      East Bound      West Bound
Movement:      L - T - R      L - T - R      L - T - R      L - T - R
-----|-----|-----|-----|
Control:      Protected      Protected      Permitted      Permitted
Rights:      Include      Include      Include      Include
Min. Green:      0 0 0      0 0 0      0 0 0      0 0 0
Y+R:      4.0 4.0 4.0      4.0 4.0 4.0      4.0 4.0 4.0      4.0 4.0 4.0
Lanes:      1 0 2 1 0      1 0 2 1 0      1 0 0 1 0      1 0 0 1 1
-----|-----|-----|-----|
Volume Module:
Base Vol:      106 1720      51      27 2044      46      54 12      29      39 20      154
Growth Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
Initial Bse:      106 1720      51      27 2044      46      54 12      29      39 20      154
Added Vol:      0 0      6      11 0      0      0 0      0      4 0      6
PasserByVol:      0 0      0      0 0      0      0 0      0      0 0      0
Initial Fut:      106 1720      57      38 2044      46      54 12      29      43 20      160
User Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
PHF Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
PHF Volume:      106 1720      57      38 2044      46      54 12      29      43 20      160
Reduct Vol:      0 0      0      0 0      0      0 0      0      0 0      0
Reduced Vol:      106 1720      57      38 2044      46      54 12      29      43 20      160
PCE Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
MLF Adj:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
FinalVolume:      106 1720      57      38 2044      46      54 12      29      43 20      160
-----|-----|-----|-----|
Saturation Flow Module:
Sat/Lane:      1600 1600      1600      1600 1600      1600      1600 1600      1600      1600 1600      1600
Adjustment:      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00      1.00 1.00      1.00
Lanes:      1.00 2.90      0.10      1.00 2.93      0.07      1.00 0.29      0.71      1.00 0.22      1.78
Final Sat.:      1600 4646      154      1600 4694      106      1600 468      1132      1600 356      2844
-----|-----|-----|-----|
Capacity Analysis Module:
Vol/Sat:      0.07 0.37      0.37      0.02 0.44      0.44      0.03 0.03      0.03      0.03 0.06      0.06
Crit Moves:      ****          ****          ****          ****
*****

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